

# VIDEO TAPE SURVIVAL: The Cleaning, Time Base Correcting and Reformatting of Deteriorating Video Tape for *Real to Reel: Artists' Video 1970-72*

Sharon Grace

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Despite having names of Greek shepherds (polystyrene, polyvinyl, polyethylene), plastic, is in essence the stuff of alchemy.... It is less a thing than the trace of a movement .... In the hierarchy of major poetic substances, it figures as a disgraced material, lost between the effusiveness of rubber and the flat hardness of metal...

Roland Barthes, *Mythologies*.

It seemed like a fun idea. A show of the first, ½" inch, open reel, video work produced in the late 1960s and early 1970s by San Francisco Bay Area artists Stephen Beck, Howard Fried, Paul Kos, Richard Lowenberg, Tom Marioni, Skip Sweeney and Willie Walker. Discussion with the artists confirmed there was interest and excitement at seeing, some 15 years later, this first Bay Area video work. For many artists it had been a time of heightened creativity as they found their muse in the unexplored dimensions of the new video technology. Introduction of the new tools coincided with the move away from materialism and the marketing of art as commodity. It had been time for the primacy of the idea over its object. Funding was provided by the California Arts Council and the San Francisco Art Institute to present the work on a large screen projector, in an evening event, *Real to Reel: Artists' Video 1970-72*, at the San Francisco Art Institute.

It was obvious from the first that we were facing some 'reel' problems. Video recorder formats had changed constantly throughout the first decade of the new technology, making it difficult for artists to reformat their work. Most of the artists no longer had the appropriate playback decks, and had not viewed their work for many years. In a magnanimous if not naive moment, I volunteered to locate the playback decks. I collected the artists' tapes; borrowed an assortment of old ½" inch, open reel, decks; applied to BAVC for subsidized use of the Harris 690 time base corrector and made arrangements with Video Free America to use their facility for the reformatting process.

I soon discovered that many of the vintage video tapes were stuck together, like rolls of Scotch tape (the non-video, sticky type). The first tape we attempted to play back froze the Sony 3650 within ten seconds; the image flickered and turned to snow, as the deck ground to a halt. This was to be the scenario for every one of the forty three, open reel tapes we attempted to play back. Clearly more information was needed in order to address the problem of the unplayable, sticky, tapes. Research revealed there are two major factors which contribute to the deterioration of video tape: environmental stress (humidity, oxygen, heat, dust) and mechanical damage (tape mishandling, poorly maintained VTRs).

Although it isn't possible here to present all the information relevant to tape composition and the causes for tape deterioration, the following describes the basics of environmental stress.

## THE CHEMICAL BREAKDOWN

Video recording tape is composed of approximately 20 wt% magnetic oxide particles and 80 wt% polymeric materials. Recording properties are ascribable to the magnetic oxide particles. Almost all commercial magnetic recording tapes employ a polyester urethane elastomer as the oxide binder and also as the backcoat binder on backcoated tapes. Storage, handling and environmental stability (aging) are related to the polymeric constituents of tape. At ambient temperatures magnetic oxide particles (recording properties) are chemically stable to oxygen and atmospheric moisture, but the polymeric materials are not. The aging of magnetic recording tape, and therefore storageability, is related to the nature and rates of chemical reactions which occur between the polymeric constituents of tape and atmospheric oxygen and moisture. All polymeric materials are commonly susceptible to degradation by chemical reaction with water, a process called "hydrolysis." The environmental factors considered here consist of oxygen, nitrogen, relative humidity (RH) and temperature. Extensive hydrolytic degradation can lead to the generation of sticky and gummy chemical products. Environmental degradation can result from oxidation and/or hydrolysis. Hydrolysis is accelerated by increases in relative humidity (RH), and both of these reactions are further accelerated by increases in temperature. If oxygen and relative humidity are excluded from the environment, the polymeric constituents are next degradable by pyrolysis, which refers to thermal breakdown of the polymeric materials at high temperatures. In general the order of degradation for polyester

based polymers is:

1. hydrolysis (moisture, humidity)
2. oxidation (oxygen)
3. pyrolysis (heat)

The chemical reaction is reversible, a property which suggests a methodology for restoring and rejuvenating environmentally degraded tapes. Being a reversible reaction, there exist environmental conditions of relative humidity (RH) at room temperature which are ideal for long-term archival preservation.

#### GOOD STORAGE HABITS

It is recommended that the storage environment have some type of environmental control to maintain temperature and humidity in the range of 70 °F and 50(RH) relative humidity. Cool and dry is better; hot and humid is worse. All tapes, both open reel and cassette, should be stored with some type of hub support, and placed vertically, like books, in storage racks. The vertical placement is necessary in order to prevent the tape from compressing downward against the flanges which can cause edge damage. Prior to storage of any recorded magnetic tape, the tape should be completely rewound end-to-end to relieve all point stresses and improper stacks. Every twelve months, all tapes in the library should be rewound end-to-end to relieve any stresses that may have occurred during storage.

#### EXTENSION OF TAPE LIFE

Once we understood the malady of the artists' 15-year-old tapes, the next step was to restore them. The Harris 690 time base corrector was not the best model for this type of technical problem. Unlike more forgiving models, the Harris 690 would display any bit of debris or loose oxide as a frame of incoherent information and hold it ad infinitum. This necessitated recleaning the heads, drum, and guides on the playback deck and starting the whole process again. A friend recommended a company on the San Francisco peninsula which had a good reputation for quality tape cleaning services. Strategies were discussed with the company engineers; we were sufficiently reassured, and the cleaning was completed - well almost. Several days later when we tried to play back the newly cleaned tapes, one out of every two played without freezing the deck. Some of the tapes required recleaning three or four times. Essentially the tape cleaning process consists of running the tape, at very high speed, over a razor-type blade which removes debris and oxidized residue from the tape surface. The residue is deposited on removable filters which are cleaned regularly.

However, there is a point of no return in the deterioration process. The technical term for this condition is "the chemical end of tape life," when the plastic polymer constituents have completely degraded. At this point, the tape will begin to shred and peel. Perhaps conservators will develop restoration techniques to correct this problem, but as of now, none exist.

All tape is deteriorating. Since tape formulations are changing, it is difficult to predict the exact storage life achievable with magnetic tape. Tape manufacturers claim that with ideal storage conditions tape may survive for fifty or one hundred years. The ½" inch open reel tapes seem to be playable for approximately five to ten years. Cassette tapes may fare a little better by virtue of their protective cartridge. Some manufacturers have produced a whole edition of faulty stock which ages prematurely; SONY high density, BR 1975, is one example.

The potential for censorship - what will survive and what won't - is clearly inherent in the problem of tape deterioration. Presently there has begun a joint effort by the National Endowment for the Arts and the American Film Institute to address the preservation and conservation of film, broadcast television and video. However, artists themselves must become and remain alert to the danger of extinction threatening their work and begin to take precautions now.

A truly useful understanding of the problem requires more space than is available here. The research material from this project is available through the Bay Area Video Coalition Library.

Sharon Grace is a Bay Area artist, Director of Video Documentation and Archiving Program and Instructor in video at San Francisco Art Institute.